BUILDING
EDUCATION
ECOSYSTEM

ISBN 978-602-8187-55-8

PROCEEDING International Seminar on Education

# "BUILDING EDUCATION ECOSYSTEM"

# PROCEEDING

## International Seminar on Education

5-6 May, 2016

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http://www.seminar.fkipunismuhmks.org

First Published 2016

TITLE: PROCEEDING OF INTERNATIONAL SEMINAR & CONFERENCE 2016

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ISBN: 978-602-8187-55-8

About the cover: Design by Muh. Zia Ul Haq. Made with processing
About the Logo: Designed by Makmun
About the photo: Abd. Rajab "Menara Iqra and Balai Sidang Muktamar"

## Foreword

The First International Seminar & Conference on Education 2016, Building Education Ecosystem, represents a growth and experience of a conference on education. The purpose of this seminar and conference is to make a scientific contribution to the field of education through discussion and publication on progress in English Language Education, Mathematics, Managements, Physics, Arts, Biology, Indonesian Language studies, Civic, and Sociology. Contributions come from experts, teachers, lecturers and graduate students from all around the archipelago.

This year the conference received 80 paper submissions and around 47 selected papers to publish at the proceeding papers. The conference invited keynote speakers from four different countries, they were from Malaysia, Japan, Australia, and Indonesia itself. Decisions about paper acceptances were reviewed and approved by the steering committee and reviewers.

The collection of papers in this conference proceedings shows a maturity in the field through new examples of pedagogical issues and theoretical advances in understanding education ecosystems. The conference success as we see publications that build on the advance references to papers published. We look forward to this publication providing the foundation for future developments in Education issues or education ecosystem.

Makassar, May 5, 2016
Indonesia
**The 1st International Conference Committee**

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## Additional Paper : Language Studies, and Civics

# Critical Thinking Skills of Students Senior High School Newton 'S Laws Materials and Application

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*ABSTRACT*

This study aims to describe the development of the Critical Skills Thinking Matter Newton's Law on Student SMAN 9 Makassar. To see the development of students' critical thinking skills seen from gain score of students before and after treatment. The results of inferential analysis showed significant differences between the experimental class (using model of Fostering Critical Thinking Skills/GCTS) the control class. This means GCTS learning model, can significantly raise high school students' critical thinking skills. Judging the amount of the effect (effect size), by calculating the difference between the average gain score critical thinking skills of students who are taught by learning model of GCTS of 0.26 and average critical thinking skills of students who are taught by without learning model of GCTS at 0.11 divided by the standard deviation the control group of 0.05. The result of the calculation is found that the magnitude of the effect of the use of the learning model of GCTS on learning of physics in order to foster critical thinking skills is 3:00 compared to learning without learning model of GCTS (control group). That is about three times larger than the average students' critical thinking skills that are taught without using model of GCTS. This indicates that the use of models of learning in the process of learning physics GCTS give effect to the development of students' critical thinking skills.

Keywords: Profiles, Critical Thinking Skills, Physics, interpretation, analysis, inference.

## Introduction

Physics is a one of branch science. Underlying the development of advanced technology and harmonious living concept with nature. As science the study of natural phenomena, physics also give good lessons shown for mankind to review living in harmony based on natural law. On level Senior High School (SHS) is deemed important to review physics is taught as a separate lesson with several considerations. First, in addition to providing supplies to students of science, physics was intended as a vehicle to growing thinking skills that are useful to solve problems in everyday life. Second, the eyes should be taught physics lesson for review purposes more specific, i.e. equip students' knowledge, understanding and ability The required number for a review into the higher education level As well as developing science and technology. By Therefore, hearts Curriculum physics should have undertaken to review the growing ability of Thinking, Scientific work, being communication and as the prayer one important aspect of Life Skills (BSNP, 2006). Singer statement in line with the skills needed for the review to develop 21st Century Technology, i.e. cognitive skills, interpersonal skills, and interpersonal

skills. In this regard, Critical Thinking skills is seen as cognitive skills hearts interpretation, analysis, evaluation, inference, explain, and arrangements Yourself (Bailin, S., et al., 1999).

The above description shows that the critical thinking skills are skills that must be cultivated for students to be able competitive in the 21st century , but to spur the development of thinking skills , including critical thinking skills , students must develop process skills ( BSNP , 2006). According Karamustafaoglu (2011), the development of science process skills enable students construct and solve problems and think critically. This possibility can occur because the components of critical thinking is largely a component of science process skills such as designing experiments, testing hypotheses, hypothesizing, predicting, inferring, classifying, measuring, observing (Hassard, J., 2005, p.332). Thus, if the students developing science process skills, then allegedly critical thinking skills they will develop. It is supported by the results of research Liliasari (2008) which states that the critical thinking skills can be developed through the development of science process skills.

## Research Method

This study is a descriptive study to reveal the critical thinking skills of high school students. Providing critical thinking skills test to some high school students in the city of Makassar with the number of students as many as 200 people. Critical Thinking Ability Test (CTAT) of Physics prepared with the following steps: (i) Adapting the questions of the book Physics: Principles and problems bouquet Zitzewitz, P., W., et. al. Problems are adapted are the questions that correspond with the indicators of critical thinking skills, namely: interpretation, analysis, and inference, (ii) provide to some colleagues who set education undergraduate, masters, and doctoral degrees to validate readability (readability) matter physics critical thinking skills. The technique of collecting the data is Critical Thinking Ability Test (CTAT) of Physics to measure students' critical thinking skills include high level cognitive processes items, namely interpretation, analysis, and inference through scientific procedures in order to solve the problem. While the Data analysis technique used is quantitative descriptive techniques.

## Results and Discussion

### *Results*

Critical thinking skills test results Students are praying one objective Implementation of Learning Model of GCTS. Therefore, to see the development of critical thinking skills of students seen from gain score of students before and after treatment with GCTS learning model in this study. The gain score as test results of students' critical thinking can be seen in Table 1 below.

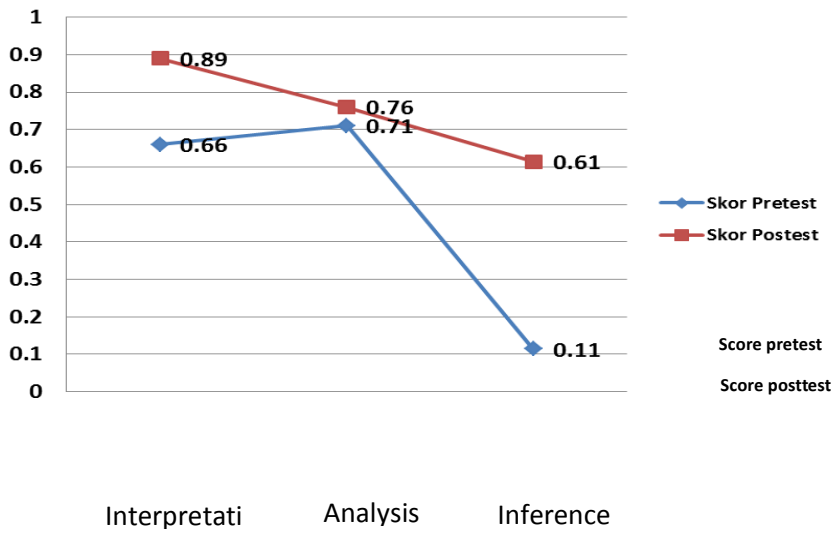
Table 1. Gain Score Test Results Critical Thinking Skills

| Indicators Thinking Skills | Critical | experiment class | | control class | |
|---|---|---|---|---|---|
| | | Score Pretest | Score Posttest | Score Pretest | Score Posttest |
| Interpretation | | 0.66 | 0.89 | 1.05 | 1.10 |
| analysis | | 0.71 | 0.76 | 1.35 | 0.58 |
| inference | | 0.11 | 0.61 | 0.57 | 1.63 |
| Scores Average | | 0.49 | 0.75 | 0.99 | 1.10 |
| Ideal score | | 27 | 27 | 27 | 27 |
| Gain | | 0.36 | | 0.07 | |
| Index gain | | low | | low | |

Table 1 shows an increase in the students' critical thinking skills, although still relatively low. However, on average the experimental class is higher increase, when compared with the control class.

## Discussion

The test results of students' critical thinking skills is one purpose of the implementation of GCTS learning model. Therefore, to see the development of critical thinking skills of students seen from gain score of students before and after treatment with GCTS learning model. Table 4.9 shows that on average students' critical thinking skills that include interpretation, analysis, and inference progressing after following study by using model of GCTS in this study, i.e. from an average of 0.49 to 0.75 with an average the maximum that may be obtained by students is 3. In detail can be seen in chart 4 below.




Graph 1. The Test Results of Students' Critical Thinking Skills

Graph 1 shows that the index gain score it's still relatively low at 0.26. The low gain score, because the learning process is only performed during 4 meetings. This means that students still have little opportunity to learn critical thinking exercises. Though Perkins, Jay, & Tishman (1993), Halpern (1995), Samani, M. (2006), states that learning requires a lot of practice critical thinking and critical thinking skills to be used as a "thinking culture". Critical thinking skills should be taught continuously (Drost, 1998: 169). Therefore, to develop students' cognitive skills including critical thinking skills is not an easy job, it takes a long time to build and develop the skills (Nur, 1998). So students should be more involved with the objects of concrete, active students act and act as a scientist. Thus, students will be accustomed and trained as well as direct experience.

As mentioned previously, one based on Table 4.9 shows an increase in the students' critical thinking skills, although still relatively low. However, the average class taught using learning model of GCTS (experimental group) higher increase, when compared with the control class. To determine whether the difference is significant or not, then do inferential statistics. The results of inferential analysis by SPSS acquired asymp value sig (2-tailed) as the p-value. Because the p-value obtained for 0.004 <α = 0.05 (5%), it means that there are significant differences between the experimental class (using model of GCTS) with grade control. This means that the CBC Learning model, can significantly raise high school students' critical thinking skills. Judging the amount of the effect (effect size), by calculating the difference between the average gain score critical thinking skills of students who are taught by GCTS learning model of 12:26 and average critical thinking skills of students who are taught by without GCTS learning model at 0:11 divided by the standard deviation the control group of 0.05 (Joyce et al, 2011: 67). Top of FormThe result of the calculation is found that the magnitude of the effect of the use of GCTS learning model in teaching physics in order to foster critical thinking skills is 3.00 compared to learning without GCTS learning model (control group). That is about three times larger than the average students' critical thinking skills that are taught without using model GCTS. This indicates that the use of models of learning GCTS in the process of learning physics give effect to the development of students' critical thinking skills.

The big difference between students' critical thinking skills are taught through learning model of GCTS with without GCTS learning model: (i) allow students to read, think, and formulate their thoughts in writing so as to encourage students express his views by giving interpretations of a given problem, (ii) Students can identify as many as possible agendas of issues relevant to learning materials, so that they can choose one of the problems and is formulated in hypothetical form (temporary answer to the question problem), (iii) students to exchange ideas in small groups that can not only increase the interest of students, but also can improve critical thinking, (iv) provides the opportunity for students to interact, reflection, and feedback in solving problems or in the process of formative assessment so that they develop critical thinking skills especially reasoning, (v) students perform activities associated with moral responsibility, social values, the

benefits of science to science and human life, as well as the attitudes and actions such as curiosity, honesty, thoroughness, diligence, caution, tolerant, saving, critical and decision-making through activities authentic investigation. So students will be familiar with a set of procedures critical thinking, (vi) students perform interpretation and inference associated with the data results of the investigation group, resulting in increased skills of interpreting and inference students based on data and develop self-confidence.

The sixth reason mentioned above in accordance with the opinion of Kincaid (2004) states that the critical thinking skills can be developed through: (a) asking questions that encourage students to express their views and ideas, (b) provides the opportunity for students to discuss in an open-ended regarding important issues and prepare reason, (c) provide opportunities for students to take part in the cooperation, solve problems and make decisions, (d) directed learning on specific skills such as interpretation, analysis, and inference, (e) learning refers to the principles of logical thinking and give practice in identifying errors in expressing logical reasons. Associated with the model or learning methods and its relationship with the critical thinking skills, Bailin et al., say that "Critical thinking involves the ability to respond constructively to others during group discussion, which implies interacting in pro-social ways by encouraging and respecting the contributions of others (Lai, E.R., 2011, p. 34)." This is reinforced research Hall (2011) which states that the method of debate (discussion) can improve communication skills, improve critical thinking skills, problem solving, and develop self-confidence. Abrami say that "Positive and significant effect of collaborative learning for improving students' critical thinking skills and dispositions (Lai, E.R., 2011, p.35)." Collaborative learning effectively improve students' critical thinking skills.

## Conclusions and Recommendations

Learning model developed to foster students' critical thinking skills. This can be seen in the average class taught using learning model of GCTS (experimental group) higher increase, when compared with the control class. The results of inferential analysis showed significant differences between the experimental class (using model of GCTS) with grade control class. This means that the GCTS Learning model, can significantly foster critical thinking skills of high school students. Judging the amount of the effect (effect size), by calculating the difference between the average gain score critical thinking skills of students who are taught by learning model of GCTS of 12:26 and average critical thinking skills of students who are taught by without learning model of GCTS at 0:11 divided by the standard deviation the control group of 0.05. The result of the calculation is found that the magnitude of the effect of the use of GCTS learning model in teaching physics in order to foster critical thinking skills is 3:00 compared to learning without learning model of GCTS (control group). That is about three times larger than the average students' critical thinking skills that are taught without using model of GCTS. This indicates that the use of models of learning of GCTS in the process of learning physics give effect to the development of students' critical thinking skills.

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